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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
NEW INTERNATIONAL PATENT APPLICATION**

TITLE: WHEEL-SET EQUIPPED WITH SHOE

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WHEEL ASSEMBLY FOR SHOE

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates, in general, to a wheel assembly mounted to a shoe and, more particularly, to a wheel assembly for a shoe, which can implement cornering in a smooth manner, and can allow wheels to be moved as desired by a user
10 between an operating position where the wheels are placed on a heel portion of the shoe to roll on a flat surface and a non-operating position where the wheels are placed on a rear end of shoe to be held detached from the flat surface.

15 Description of the Prior Art

In Korean Patent Application No. 2001-7012551, there is disclosed a shoe to a heel portion of which a wheel is mounted to give a user the ability to glide on flat surfaces one could only walk. Referring to Fig. 8, the conventional heeling
20 device mounted to the shoe 900 comprises a mounting section defined with an opening, a shaft 910 supported by the mounting section, and a wheel 930 fitted around the shaft 910.

The wheel 930 is detachably mounted to the mounting section. Therefore, in the case that the shoe 900 is used to
25 roll or slide on a flat surface, the wheel 930 is mounted to

the mounting section, and in the case that the shoe 900 is used to walk or run on the flat surface, the wheel 930 as fitted around the shaft 910 is removed from the mounting section.

However, the conventional heeling device mounted to the shoe suffers from defects as described below.

First, while the user glides on the flat surface using the wheel 930, when it is necessary to convert the heel-rolling state of the shoe 900 into a walking or running state, the user must remove and separately keep the wheel 930 from the shoe 900. For this reason, the possibility of the wheel 930 to be lost is increased, and a sanitary problem is raised since it is the norm that the unclean wheel 930 is usually kept in a pocket.

Second, in consideration of the fact that the single wheel 930 is fitted around the shaft 910, since the wheel 930 has to support a weight of the user in a sufficient manner, the wheel 930 must have a substantial width. By this fact, when it is necessary for the shoe to implement cornering rather than going directly forward, because a difference is caused in rotational velocity between both ends of the wheel 930, smooth cornering of the shoe 900 cannot be ensured, and partial wearing is provoked on a surface of the wheel 930.

Third, by the fact that the wheel 930 having a substantial width is closely mounted to the mounting section, heat produced in the mounting section due to sliding contact between the

wheel 930 and the flat surface cannot be sufficiently dissipated and rather is transmitted to the foot of the user to deteriorate wearability of the shoe.

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SUMMARY OF THE INVENTION

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a wheel assembly
10 for a shoe, which is simply constructed to allow the shoe to be conveniently converted from a heel-rolling or sliding state into a walking or running state to thereby be used as the conventional shoe without the need of removing a wheel from the shoe.

15 Another object of the present invention is to provide a wheel assembly for a shoe, which is constructed to compensate a difference in rotational velocity caused between both ends of the wheel assembly when a user implements cornering, whereby partial wearing of the wheel assembly is reduced.

20 Still another object of the present invention is to provide a wheel assembly for a shoe, which can easily dissipate frictional heat produced in a wheel part to thereby reduce the frictional heat transmitted to the foot of the user.

In order to achieve the above object, according to one
25 aspect of the present invention, there is provided a wheel

assembly for a shoe, comprising: a housing attached to a heel portion of the shoe and defined with an opening; and a wheel section mounted to the housing in a manner such that a pair of wheels of the wheel section can be moved between an operating
5 position in which they are received in the opening of the housing to be partially exposed out of a lower surface of the housing and a non-operating position in which they are taken out of the opening of the housing to be seated on a rear end portion of the shoe.

10 According to another aspect of the present invention, the wheel section comprises the pair of wheels, a shaft for supporting the pair of wheels, and a support bracket having one end which is connected to the shaft and the other end which is connected to the shoe by a hinge pin.

15 According to another aspect of the present invention, each of the wheels is rotatably supported by a ball bearing, and the wheels are structured to emit lights while they are rotated.

 According to another aspect of the present invention, both ends of the shaft are respectively formed with external
20 threads, and a pair of cap elements are threadedly locked to the external threads; and a pair of flange portions having a predetermined height are integrally formed on a circumferential outer surface of the shaft at pre-selected locations, respectively.

25 According to another aspect of the present invention, the

support bracket has a configuration of a plate, and, by bending and riveting both ends of the plate, the support bracket is defined with a shaft insertion groove through which the shaft is inserted and a pin insertion groove through which the hinge
5 pin is inserted, and wherein the support bracket is defined at substantially a middle portion thereof with a slot which extends in a lengthwise direction of the support bracket.

According to still another aspect of the present invention, the housing has a pair of semi-cylindrical shaft
10 receiving grooves which are defined at both axial ends of the opening so that both ends of the shaft can be received in the shaft receiving grooves, respectively, and a pair of hinge holes which are defined at a rear end of the housing so that both ends of the hinge pin can be inserted through the hinge
15 holes, respectively.

According to yet still another aspect of the present invention, the rear end portion of the shoe is formed with an engaging projection so that the engaging projection can be close-fitted into the slot defined in the support bracket to
20 hold the wheel section to the non-operating position.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages
25 of the present invention will be more clearly understood from

the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a partially broken-away side view illustrating a shoe to which a wheel assembly in accordance with an embodiment
5 of the present invention is mounted;

Figs. 2a and 2b are a perspective view and a sectional view illustrating the wheel assembly according to the present invention;

Fig. 3 is an exploded perspective view illustrating a
10 wheel section which constitutes the wheel assembly according to the present invention;

Fig. 4 is a perspective view illustrating a housing which constitutes the wheel assembly according to the present invention;

15 Figs. 5a and 5b are a bottom view and a rear view illustrating an unfolded operating position of wheels of the wheel assembly according to the present invention;

Figs. 6a and 6b are a bottom view and a rear view illustrating a folded non-operating position of the wheels of
20 the wheel assembly according to the present invention;

Fig. 7 is a side view illustrating a state wherein the wheels of the wheel assembly slide on a flat surface;

Fig. 8 is a side view illustrating a shoe to which the conventional wheel is mounted;

25 Fig. 9 is a partial bottom view of Fig. 8; and

Figs. 10a and 10b are views for comparing the present invention with the conventional art.

DETAILED DESCRIPTION OF THE INVENTION

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Reference will now be made in greater detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. Wherever possible, the same reference numerals will be used throughout the drawings and the description to refer to the same or like parts.

Fig. 1 is a partially broken-away side view illustrating a shoe to which a wheel assembly in accordance with an embodiment of the present invention is mounted; and Figs. 2a and 2b are a perspective view and a sectional view illustrating the wheel assembly according to the present invention.

As shown in the drawings, a wheel assembly in accordance with an embodiment of the present invention, designated by the reference numeral 10, comprises a housing 30 attached to a heel portion 51 of a shoe 5, and a wheel section 20 for selectively positioning a pair of wheels 210 and 210' in the housing 30 and on a rear end portion 53 of the shoe 5.

The housing 30 attached to the heel portion 51 of the shoe 5 is defined with an opening in which the pair of wheels 210 and 210' can be accommodated. A pair of semi-cylindrical shaft

receiving grooves 310 are defined at both axial ends of the opening so that both ends of a shaft 230 can be received in the shaft receiving grooves 310, respectively, and a pair of hinge holes 330 are defined at a rear end of the housing 30 so that
5 both ends of a hinge pin 259 can be inserted through the hinge holes 330, respectively. The rear end portion 53 of the shoe 5 is formed with an engaging projection 350. The engaging projection 350 is formed to have a size and a shape which allow the engaging projection 350 to be close-fitted into a slot 257
10 defined in a support bracket 250 as will be described later in detail. Hence, due to the fact that the engaging projection 350 is close-fitted into the slot 257, the support bracket 250 including the pair of wheels 210 and 210' can be securely held with respect to the rear end portion 53 of the shoe 5 (see
15 Figs. 2b and 4).

As can be readily seen from Fig. 3, the wheel section 20 comprises the pair of wheels 210 and 210', the shaft 230 for supporting the pair of wheels 210 and 210', and the support bracket 250.

20 The wheels 210 and 210' are rotatably supported by ball bearings 215 while being fitted around the shaft 230. In this preferred embodiment of the present invention, the wheels 210 and 210' may be structured to emit lights while they are rotated. As the wheel 210 and 210', a wheel of a narrow width,
25 similar to those used in an in-line skate, may be used.

The wheel section 20 of the present invention has the pair of wheels 210 and 210'. In this regard, referring to Fig. 10a, when assuming a user goes around a corner having a short radius, an outside rotation radius is substantially greater than an inside rotation radius, and therefore, an outside end of a wheel must be rotated at a velocity greater than that of an inside end of the wheel. In spite of these considerations, in the conventional art, since the single wheel 930 having a large width is used, the inner and outer ends of the wheel 930 are rotated at the same velocity. Accordingly, a partial wearing phenomenon occurs in the wheel 930 due to a difference in rotational velocity between the inner and outer ends of the wheel 930, whereby smooth cornering of the wheel 930 cannot be ensured.

However, in the present invention, by the fact that the pair of wheels 210 and 210', that is, the inner wheel 210' and the outer wheel 210 are fitted around the shaft 230 by way of their respective ball bearings 215, even though a rotational velocity difference is caused between the outer and inner wheels 210 and 210', smooth and calm cornering of the wheels 210 and 210' is ensured, and partial wearing does not occur in any of the outer and inner wheels 210 and 210'. Also, because a gap is sufficiently secured between the pair of wheels 210 and 210', heat produced due to the rotation of the wheels 210 and 210' can be easily dissipated into the surrounding air.

The shaft 230 are structured to ensure that the wheels 210 and 210' are reliably rotated and to sufficiently stand a load applied by a weight of the user. Referring to Fig. 3, both ends of the shaft 230 are respectively formed with external threads 231, and a pair of cap elements 235 are threadedly locked to the external threads 231. A pair of first flange portions 233 are integrally formed on a circumferential outer surface of the shaft 230 at pre-selected locations, respectively. A pair of second flange portions are also formed on circumferential outer surfaces of the cap elements 235, respectively. Consequently, after fitting the wheels 210 and 210' around the shaft 230 which is formed with the first flange portions 233, by threadedly locking the cap elements 235 to the external threads 231 of the shaft 230, the wheels 210 and 210' are securely maintained while being intervened between the first flange portions 233 of the shaft 230 and the second flange portions of the cap elements 235.

The support bracket 250 is formed by riveting a plate-shaped sheet material using rivets 255. In the case of defining in advance the shaft insertion groove 251 in which the shaft 230 is to be inserted, it is impossible to properly insert the shaft 230 through the shaft insertion groove 251 due to the presence of the first flange portions 233 which are formed on the shaft 230. Thus, before riveting the support bracket 250, the shaft 230 is inserted through the shaft

insertion groove 251. Thereafter, riveting of the support bracket 250 is conducted.

As shown in the drawings, a front end of the support bracket 250 is defined with the shaft insertion groove 251, and
5 the rear end of the support bracket 250 is defined with the pin insertion groove 253 through the hinge pin 259 is inserted. Also, the support bracket 250 is defined at substantially a middle portion thereof with the slot 257 which extends in a lengthwise direction of the support bracket 250. Both ends of
10 the hinge pin 259 which is inserted through the pin insertion groove 253 are also fitted through the pair of hinge holes 330 of the housing 30, so that the support bracket 250 can be rotated about the hinge pin 259.

By the construction of the wheel assembly 10 according to
15 the present invention, while the user glides on a flat surface using the wheels 210 and 210', if the user wants to convert the heel-rolling state of the shoe 5 into a walking or running state, the wheels 210 and 210' which are accommodated in the opening of the housing 30 are taken out of the opening by the
20 user's fingers, and then, the support bracket 250 is rotated about the hinge pin 259 so that the slot 257 of the support bracket 250 is closely engaged with the engaging projection 350. Accordingly, because the wheels 210 and 210' do not project out of a lower surface of the shoe 5 and instead
25 positioned on the rear end portion of the shoe 5, the shoe 5

can be used as usual. On the contrary, if the user wants to convert the walking or running state of the shoe 5 into the heel-rolling state, by disengaging the support bracket 250 from the engaging projection 350 and then accommodating the wheels 5 210 and 210' into the opening of the housing 30, the user can glide on the flat surface using the wheels 210 and 210' which project out of the lower surface of the shoe 5.

As apparent from the above description, the wheel assembly for a shoe according to the present invention, constructed as 10 mentioned above, provides advantages in that the shoe equipped with the wheel assembly can be used to roll or slide on a flat surface using a pair of wheels and can be used as the conventional shoe through simple manipulation without the need of removing the wheels from the shoe.

15 Further, when a user implements cornering using the wheels, since it is possible to compensate a difference in rotational velocity between both wheels, partial wearing of the wheels is prevented, and smooth cornering is ensured.

Moreover, due to the fact that a gap is sufficiently 20 secured between the pair of wheels, frictional heat produced in the wheels can be easily dissipated into the immediate environment, whereby it is possible to prevent the frictional heat from being transmitted to the foot of the user.

Although a preferred embodiment of the present invention 25 has been described for illustrative purposes, those skilled in

the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.